

OPERATIONS REPORT

Air Leak in Cascade on May 23, 1945

DETECTION OF G-74 AND AIR LEAK

When G-74 or air leaks into the process gas, separation takes place and the lighter gases travel up the plant at a rate of about two cells per minute.

There are two line recorders in each building at different cells which record the progress of packets as well as all lasting leaks as low as 50 scf/day. Normal cell inleakage is between 3 and 12 scf/day. If the inleakage is temporary, as when placing cells on stream, the concentration drops at once to its original value; if the leak is caused by a break in the pipes or by an open G-74 valve, the concentration remains high at the source and spreads as the air moves up the cascade.

The time lag in the instruments is less than two minutes.

Leaks above 2000 scf/day are considered serious and those above 20,000 scf/day are a hazard to continued plant operation and must be isolated in the shortest possible time. These values are specified for initial operation and will be lowered for later cases when smaller size equipment is put on stream.

INTRODUCTION

The purpose of this memorandum is to familiarize the operating and designing groups with the actual behavior of diffusion equipment in the case of large air or G-74 leaks. This is the first opportunity to present data on G-74 distribution and pressure surges for such a large leak.

SUMMARY

Table I lists the sequence of events during the emergency on 3/23/45.

3356
5/30/45

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
1st Review Date: 4-20-77	Determination (Circle Number(s))
Authority: <input type="checkbox"/> ADC <input checked="" type="checkbox"/> ADD	1. Classification Retained
Name: m. p. h. e. n	2. Classification Changed To:
2nd Review Date: 4/25/97	3. Contains No DOE Classified Information
Authority: ADD N. G. S. J. o. l. i. n. g	4. Coordinate With:
Name: J. e. n. g. s. J. o. l. i. n. g	5. Classification Cancelled
	6. Classified Information Bracketed

DOE-OR QA
Case # 3356
Date 7/29/17

as well as can be determined from all sources of information. A leak occurred in K-310-3 just as the Line Recorder was being switched from cell 4 to cell 2. It was suspected that the leak was in cell 2 since this cell had just been put on stream. The line recorder station in this building and in the Central Control Room reported an air leak to the operators 25 minutes after the leak began. The concentration in K-310-3.2 was then only 2-3% G-74. Cell 2 was isolated about one hour later and the G-74 concentration was 30% in the cell but no leak was found in this cell. About 20 minutes later Section 600 surge drums were filled with C-616 and it was necessary to isolate this section. The bottom building (K-311-1) immediately filled with C-616 and G-74. K-310-3 was isolated and cell 5 was found to have been the source of the inleakage of air. This was two hours after the leak occurred. Most of the cells in K-311-1 and K-310-2 were overloaded during the next hour and a half and shut down when the circuit breakers tripped. Several severe surges were caused, partly due to operators in the Section 2b increasing the stage pressures.

Upon examination of cell 5, K-310-3, a six-inch crack was found in the rolled bend of the expansion joint near the weld to the pipe in the 3rd stage. This expansion joint is one of the older types installed in only a few of the buildings. The later type has a greater radius bend at this point and should be less susceptible to this trouble.

The size of the leak is of great interest, as the time necessary to prevent disruption of the entire cascade is dependent on this rate. A leak of the size in K-310-3 (approximately 200,000 scf/day) should be isolated at once, but since it was rather small at first, a delay of about 30 minutes seems justifiable in this case.

On 5/24/45, K-311-1, K-310-3 and K-310-2 were back on stream and the air had been purged from the plant through several cold trap rooms.

It is estimated that all cells in K-310-3 are plugged 25-30%, but it appears that none of the other buildings were affected. This was deduced from the control valve positions and motor loads.

To prevent such accidents in the future, it is generally recognized that much less caution is required on the part of the line recorder operators and building operators to quickly isolate equipment. Isolating buildings should cause no damage to equipment or production, and is the quickest method of confining the leak. This procedure has now been publicized. Some of the emergency procedures, including the system of communications, will probably be simplified when the permanent Central Control Room is functioning. In many cases the line recorder station or Central Control Room can easily locate the offending cell by scanning. The cascade coordinators office has been transferred to the Central Control Room so that plant operators may be directed from this point. The pressures in the Section 600 surge drums are very indicative of the magnitude of leaks and this information should be used to decide when K-311-1 or the bottom building should be operated on Inverse Recycle to absorb surges. If the intersectional surge drums are kept evacuated, they would offer convenient means of quickly adding surge capacity.

DISCUSSION OF CHARTS

A series of curves (Figures 2-15) of G-74 concentrations versus time have been plotted for each of fourteen buildings of the cascade.

Most of the graphs were drawn on two scales to show the same early rise

of G-74 concentrations as obtained on the line recorder chart so